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ABSTRACT

A study examined the impact of sex composition of occupation on women's earnings and the structure of wage determination in "masculine" and "feminine" occupations. Data--a national sample of women--came from the Project Talent Data Bank. Results indicated that, overall, women in "masculine" occupations earned approximately 42% more annually than women in "feminine" occupations. After controlling for differences in labor force participation levels, personal characteristics, education, work experience, and family responsibilities, women in "masculine" occupations still earned about 18% more than those in "feminine" occupations . The findings appeared to be consistent with the notion that there is an across-the-board bonus associated with women finding employment occupations with a predominance of male workers. (Three data tables are appended.) (Author/YLB)

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Sex-Composition of Occupation and the Determinants of Women's Earnings

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Sex-Composition of Occupation and the
Determinants of Women's Earnings

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Abstract

Using a national sample of women, this study examines the impact of sex-composition of occupation on women's earnings and the structure of wage determination in "masculine" and "feminine" occupations. Results indicate that, overall, women in "masculine" occupations earn approximately 42% more annually than women in "feminine" occupations. After controlling for differences in labor force participation levels, personal characteristics, education, work experience, and family responsibilities, women in "masculine" occupations still earn about 18% more than those in "feminine" occupations. The findings appear to be consistent with the notion that there is an across-the-board bonus associated with women finding employment occupations with a predominance of male workers.

Sex-Composition of Occupation and the Determinants of Women's Earnings

A number of researchers have concluded that the large wage differences between working men and women are primarily due to occupational segregation by sex (Fuchs, 1971; Kahne & Kohen, 1975; Sanborn, 1964; Sawhill, 1973; Stevenson, 1975). While the segregation of women into jobs which do not increase their productivity over time appears to be at the root of the male-female wage gap, the extent to which the sex-composition of occupations explains earnings differences among women is relatively unexplored. This is an important issue in terms of assessing the importance of differential human capital investment as opposed to discrimination in wage determination. Jusenius (1975) has found that women in occupations with a higher percentage of men tend to earn more than otherwise similar women in more "feminine" occupations. Whether this is due to these occupations having different wage determination structures, such as greater returns to human capital investment in masculine occupations, needs to be assessed.

This paper assesses how the sex-composition of an occupation influences women's wages. It investigates the following questions: (1) Do women in occupations with a majority of female workers ("feminine" occupations) earn less than women in occupations with a predominance of male workers ("masculine" occupations)? (2) If they do, is it because women in feminine occupations have less schooling and other forms of

human capital? (3) Does the impact of women's characteristics on earnings vary with the sex-type of the occupation? (4). Are the returns to human capital factors, such as work experience and education, higher in masculine occupations?

Theoretical Perspective

While occupational segregation may be the result of discrimination against women in access to better-paying jobs (Bergmann, 1974; Weisskoff, 1972; Zellner, 1972), human capital theory suggests that sex differences in occupational distribution may result from rational individual choices based on expectations about the future (Kreps, 1971; Zellner, 1975). A human capital or labor supply explanation for occupational segregation assumes that occupations vary in terms of the formal training required for job entry and in terms of the on-the-job training necessary to acquire job skills. While both forms of human capital investment ultimately yield the individual greater economic rewards, "investment" is by definition costly in that current benefits or income are foregone in an attempt to secure higher future benefits. Thus, the profitability of such investments depends on the length of employment.

Since men generally anticipate a lifetime of continuous full-time work, they are less hesitant to enter, and indeed probably seek out, occupations which increase their productivity over time via on-the-job training. Most women, on the other hand, are in the labor force intermittently. Therefore, they are probably more likely to enter occupations in which the gain in skill achieved by continuous experience

is slight and loss of skill during periods of labor force absence is small. There is some evidence that traditionally feminine occupations, such as teaching and clerical work are characterized by these features (Caplow, 1954; Oppenheimer, 1970, 1975; Wolf & Rosenfeld, 1976). Unfortunately, to the extent that increased skill is rewarded in the labor market, this means that increases in women's earnings are lower and their opportunities for promotion and advancement are limited.

Thus, human capital theory implies that occupations dominated by men will tend to require more on-the-job training and labor force commitment than occupations dominated by women. Since direct measures of on-the-job training are difficult to acquire, economists typically use a work experience-earnings profile as an indirect measure. That is, to the extent that earnings change over the course of one's years in the labor force, such changes are attributed to differences in productivity resulting from human capital investment or deterioration (Mincer & Polachek, 1974). If this economic rationale for occupational segregation is correct, returns to work experience should be greater in masculine occupations than they are in feminine occupations, after controlling for the amount of schooling required for job entry. Furthermore, in order to distinguish between the effects of discrimination and human capital investment in wage determination, this must be true for women as well as men in these occupations.

The Model

Researchers of occupational segregation tend to define "masculine" and "feminine" occupations in slightly different ways. Generally, the criterion used depends on the proportion of women in the labor force at the time period under consideration. For example, if women constitute roughly 38% of the labor force, as they did in 1971, and they are randomly distributed across all occupations, then each occupation should be composed of approximately 38% women. Occupations which have significantly more than 38% women would be defined as "women's" occupations. Conversely, occupations with significantly fewer women would be termed "men's" occupations.

Using variations on this principle, Oppenheimer (1970) defines a female occupation as one composed of 70% or more females, Corcoran (1975) defines a female occupation as one with more than 60% female workers, and Jusenius (1975) defines "women's" and "men's" occupations as ones with 43.1% or more women workers and 33.1% or fewer women workers, respectively. For the analyses which follow, feminine occupations are defined as ones with 60% or more women workers and masculine occupations are those with 49% or fewer women workers. This criterion was chosen because it was almost identical to the one used by Corcoran (1975) and Talent occupational scores divided cleanly at these points.[1]

Following a well-developed body of literature on earnings determination (e.g., Blinder, 1973; Jencks, 1972; Mincer & Polachek, 1974; Polachek, 1975; Sandell & Shapiro, 1978; Sawhill, 1973; Sweet,

1973) a woman's annual earnings are conceptualized to be a function of a set of variables which influence her value and productivity in the marketplace.

First, earnings will vary with the extent of labor force participation (part-time or full-time employment). That is, women who work more hours per week and more weeks per year will generally have higher annual earnings, other things being equal.

Second, earnings will tend to vary positively with human capital factors such as work experience and schooling since these variables proxy job-related skills.

Third, earnings are affected by personal characteristics such as ability, race and socioeconomic background.

Fourth, current family-related characteristics such as marital status and number and ages of children may influence a woman's earnings. Married women and women with children, particularly young children, probably have greater home responsibilities than other women. Thus, they may not be able to invest as much effort in their jobs and this may be reflected in lower earnings. Alternatively, employers may discriminate against such women in terms of promotions or pay raises because of the widespread belief that married women work only to earn "pin money."

Finally, sex-composition of occupation is included in the model, since this variable is of primary interest. Based on previous research

(Corcoran, 1975; Jusenius, 1975), it is expected that women in more feminine occupations will generally earn less than women in more masculine occupations.

Thus, the empirical model for the analysis is specified as follows:

Annual Earnings = f (Personal Traits, Human Capital Accumulation, Family Responsibilities, Current Labor Force Participation, Sex-Composition of Occupation)

where,

Annual Earnings = Natural logarithm of annual earnings in 1971.

Personal Traits

- Socioeconomic Background = Talent's composite index of the socioeconomic status of the family of origin ($\bar{X}$ = 100, S.D. = 10).
- Race = Dummy variable; coded 1 if white, 0 otherwise.
- Academic Ability = Talent's general academic aptitude composite, standardized using the 11th grade mean and standard deviation ($\bar{X}$ = 100, S.D. = 15).

Human Capital Accumulation

- Education = Years of education attained by 1972.
- Work Experience = Years of full-time work experience.

Family Responsibilities	Marital Status = Dummy variable; coded 1 if married, 0 otherwise. Age of Youngest Child = Age of woman's youngest child. Family Size = Number of children woman has.
Current Labor Force Participation	Weeks Worked/Year = Number of weeks worked in 1971. Hours Worked/Week = Number of hours work per week in 1971.

Occupation Sex-Composition = Percent women in occupation in 1971.

The model is specified in semi-log form since this specification is most commonly used in economic analyses of earnings.

Sample and Data Analyses

The data for this study come from the Project Talent Data Bank. In methodology, Project Talent is both cross-sectional and longitudinal. That is, students in grades 9 through 12, first studied in 1960, are followed-up aperiodically. For the original survey in 1960, Project Talent administered a battery of tests and questionnaires to over 400,000 students representing a stratified random sample of high school students in the U.S. (see Flanagan, et al., 1962). Approximately 1/4 of

these students (92,272) were in the eleventh grade. The schools taking part in the survey constituted a 4-1/2% sample of all high schools (public, private, and parochial) in 1960.

In 1972, eleven years after students were to have graduated from high school, follow-up questionnaires were sent to 91,602 of the eleventh grade sample (the remainder were deceased or had asked Talent to remove their names from the mailing list). Of this group, about 25% (22,968) responded. Talent undertook an intensive follow-up of a 3.57% sample of the nonrespondents and obtained a response rate of 83%. The total eleventh grade sample, from which the sample of women used in this study is drawn, consists of these successfully contacted nonrespondents plus a random 3.61% of the individuals who returned the questionnaires initially. Of these 2,906 persons, 1,479 are female. These women constitute the basic sample for this study. However, the analyses reported on are based on a subsample of women with data on all variables used in the analyses (N=401). Data are analyzed using multiple regression analysis.

Results

Table 1 shows the means and standard deviations for all variables used in the analyses. These descriptive statistics indicate that women in masculine and feminine occupations are substantially the same in terms of the mean levels of characteristics being considered. Nevertheless, women in feminine occupations earn $5,128 annually in comparison to the $7,305 earned by women in occupations with a majority of male workers, a difference of over $2,000. Thus, before controlling

for any other differences between these women, those in masculine occupations earn approximately 42% more than those in feminine occupations.

The regression results shown in Table 2 support the notion that there are economic gains that accrue to women who work in male-dominated occupations, even after other variables are controlled. The standardized coefficients indicate that current level of labor force participation is, of course, the most important determinant of annual earnings. In addition, however, Talent women's earnings are positively and significantly affected by work experience, level of education, measured academic ability, and sex-composition of occupation. On the average, a 10% increase in the number of men in an occupation boosts women's annual earnings by about $176. While this may not appear to be a substantial amount, it should be considered in light of the fact that occupations here classified as "feminine" are composed of 15% men, on the average, while occupations classified as "masculine" are composed of 76% men, on the average. Thus, merely equalizing the sex-composition of these occupations would reduce the aforementioned wage differential by $1,056, or about 50%. The remaining 50% of the wage difference can be attributed to women in feminine occupations having about one year less education and working about two weeks less each year. Each of these two respective components is worth roughly $410 and $586 annually.

It is also interesting to note that while marital status and childbearing responsibilities tend to be important determinants of women's labor force participation, the results shown in Table 2 indicate

that these variables do not appear to influence earnings once other factors are controlled. That is, if young married women and women with children are able to maintain their attachment to the labor force, these data indicate that their earnings will not suffer.

As discussed earlier, an economic rationale for sex differences in occupational distribution based on labor supply expectations assumes that, controlling for the level of schooling required by a job, masculine occupations reward higher levels of labor force participation more than do feminine occupations. The regression results shown in Table 3 do not support this hypothesis. While the returns to hours worked per week and weeks worked per year are slightly higher in masculine occupations, these differences are not statistically significant. Furthermore, contrary to expectations, work experience is found not to significantly increase women's earnings in masculine occupations, but it does significantly increase the earnings of women in feminine occupations by about 4.3% or $221 for each additional year. Earnings in masculine occupations are found to be positively and significantly affected by only current level of labor force participation and years of education. Earnings in feminine occupations are positively and significantly determined by current level of labor force participation, work experience, years of education, and academic ability. Interestingly, an additional year of education is worth about $731 annually to women in masculine occupations while it is worth about $308 to women in feminine occupations, other things being equal. Again, marital status and childrearing responsibilities are found not to

influence earnings in either occupational group, once other factors are controlled.

Conclusion

The analyses reported here indicate that there are substantial economic rewards associated with being in occupations primarily composed of men. In large part, these rewards appear to be independent of many factors generally thought to be associated with productivity.

Contrary to expectations based on human capital theory, work experience is found not to significantly increase women's earnings in masculine occupations, while it does significantly increase the annual earnings of women in feminine occupations. This finding is rather surprising and two possible explanations come to mind. First, perhaps women in masculine occupations have not worked long enough to reap the rewards of the on-the-job training they are investing in--that is, returns are not continuous. At the same time, returns to work experience in women's occupations may soon set in. It would require an older sample of women to pursue this hypothesis as well as to examine the points at which these changes occur, if they do. Second, within masculine occupations in particular, skill requirements not proxied by years of education may vary significantly and the value of work experience may depend on these skill levels. Jusenius (1975) reports that returns to work experience do depend on the level of skill required by a job. The greater variation in years of schooling for those in masculine as opposed to feminine occupations (sd=2.35 and 1.81, respectively) suggests that the "men's" jobs in this sample are less

homogeneous in terms of skill requirements. Therefore, important differences in job characteristics are no doubt still unmeasured.

While returns to characteristics do vary somewhat by sex-type of occupation, there is also little evidence to support alternative economic rationales, such as that marital status or family responsibilities present greater disadvantages to women in masculine occupations than to those in feminine occupations.[3] If young married women and women with children are able to maintain their attachment to the labor force, the results indicate that their earnings will not be affected by their family responsibilities. This seems to be true for earnings in both masculine and feminine occupations, at least early in one's career.

Rather, the results seem to be more consistent with the notion that there is an across-the-board bonus associated with being in a more "masculine" occupation. Before controlling for any diffferences among women, those in masculine occupations earn approximately 42% more than those in feminine occupations. After controlling for differences in labor force participation, personal characteristics, education, work experience, and family responsibilities, women in masculine occupations still earn about 18% more than women in feminine occupations.

Thus, it is clear that there are financial rewards that accrue to women who can obtain jobs in predominantly male occupations. This may be the result of "occupational crowding" (Bergmann, 1974) which keeps the supply of workers in "feminine" occupations artificially high while keeping the supply of workers in "masculine" occupations artificially

low. Since union membership has been found to enhance earnings (e.g., Blinder, 1973) and women workers have been notoriously difficult to unionize (Olsen & Katsuranis, 1978), analyses not reported here were undertaken to assess whether degree of unionization of occupation could explain the effect of sex-composition on earnings. These analyses indicated that the remaining wage differential could not be attributed to greater unionization of the masculine occupations.

Footnotes

[1]Analyses using Jusenius' (1975) definition of masculine and feminine occupations (% women $\leq$ 33 and % women $\geq$ 43, respectively) found the same pattern of results, but sample size in masculine jobs was reduced to 80.

[2]The analyses in Tables 1, 2, and 3 are based on women with data on all variables in the model, with the exception of age of youngest child. Deletion of cases on the basis of missing data on this variable would have eliminated women without children. Thus, a pairwise within listwise analysis was performed. For women in "feminine" occupations, N=266 for all variables, except age of youngest child (N=208). For women in "masculine" occupations, N=135 for all variables except age of youngest child (N=94).

[3]The correlation between marital status and hours worked per week is -.15 and -.05 for feminine and masculine occupations, respectively. This hints at the possibility that feminine occupations offer women more opportunity for part-time work, but this is purely speculative.

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TABLE 1. Means and Standard Deviations for all Variables in the Analysis

Variable	All Women (N = 401)	Women in "Feminine" Occup. (N = 266)	Women in "Masculine" Occup. (N = 135)
	$\bar{X}$ (S.D.)	$\bar{X}$ (S.D.)	$\bar{X}$ (S.D.)
Annual Earnings	5,860.99 (3,626.90)	5,128.26 (2,946.06)	7,304.74 (4,351.65)
Natural Log of Annual Earnings	8.39 (.96)	8.26 (.96)	8.66 (.91)
Socioeconomic Background	98.71 (9.72)	97.94 (9.57)	100.21 (9.87)
Race (1 = White, 0 = Other)	.91 (.29)	.89 (.32)	.94 (.24)
Academic Ability	102.97 (13.14)	101.65 (12.67)	105.56 (13.70)
Years of Education	13.40 (2.05)	13.10 (1.81)	14.00 (2.35)
Marital Status (1 = Married, 0 = Other)	.80 (.40)	.82 (.39)	.76 (.43)
Age of Youngest Child	5.04 (2.75)	5.11 (2.86)	4.90 (2.51)
Number of Children	1.46 (1.14)	1.51 (1.12)	1.37 (1.20)
Weeks Worked/Year	46.04 (12.00)	45.39 (12.72)	47.33 (10.35)
Hours Worked/Week	35.82 (10.76)	35.28 (10.82)	36.87 (10.59)
Years of Work Experience	7.26 (2.85)	7.30 (2.84)	7.18 (2.88)
Percent Men in Occupation	35.40 (32.20)	14.88 (13.25)	75.83 (16.30)

TABLE 2. Estimates of the Determinant's of Women's Earnings (N = 401)[1]

Dependent Variable = Log of Annual Earnings

Independent Variables	B (S.E.)	β
Socioeconomic Background	.006 (.004)	.06
Race (White)	-.175 (.113)	-.05
Academic Ability	.007* (.003)	.09
Education	.071* (.020)	.15
Sex Composition	.003* (.001)	.09
Marital Status	.009 (.076)	.00
Age of Youngest Child	.004 (.013)	.01
Number of Children	.003 (.033)	.00
Weeks Worked/Year	.046* (.003)	.57
Hours Worked/Week	.031* (.003)	.34
Work Experience	.042* (.013)	.13
Constant	2.74	
S.E.	.51	
$\bar{R}^2$	.73	

*p<.01

[1]See fn. 2 for sample description.

TABLE 3. Estimates of the Determinants of Women's Earnings in "Masculine and "Feminine" Occupations[1,2]

Dependent Variable = Log of Annual Earnings

	"Masculine" Occup. (N = 135)		"Feminine" Occup. (N = 266)	
Independent Variables	B (S.E.)	β	B (S.E.)	β
Socioeconomic Background	.002 (.006	.02	.008 (.004)	.08
Race (White)	-.023 (.234	-.06	-.167 (.131)	-.06
Academic Ability	-.001 (.005)	-.02	.008* (.004)	.10
Years of Education	.100** (.034)	.26	.061* (.026)	.11
Marital Status	.060 (.127)	.03	-.035 (.098)	-.02
Age of Youngest Child	-.004 (.024)	-.01	.007 (.016)	.02
Number of Children	-.038 (.059)	-.05	.030 (.040)	.03
Weeks Worked/Year	.051 (.005)	.58	.044** (.003)	.59
Hours Worked/Week	.036** (.006)	.42	.029** (.004)	.32
Work Experience	.033** (.025)	.10	.043** (.016)	.13
Constant	3.41		2.68	
S.E.	.48		.53	
$\bar{R}^2$	.75		.71	

*p <.05 **p <.01

[1]"Masculine" occupation has 49% or fewer females, "Feminine" occupation has 60% or more females.

[2]See fn. 2 for a sample description.